Dealing with Drought

Aligning Farmer Needs and Advisor Confidence, Skills, and Expertise

Senator George J. Mitchell Center for Sustainability Solutions

Spring Sustainability Talks | March 27, 2023

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SCHOOL OF FOOD AND AGRICULTURE

1865 THE UNIVERSITY OF MAINE

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Funding, support, and participation

Maine Organic Farmers and Gardeners

1865 The University of Maine Cooperative Extension

Northeast SARE Sustainable Agriculture Research & Education

maine Department of Agriculture Conservation & Forestry

What is DROUGHT?

“A period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrological imbalance in the affected area” - Glossary of Meteorology (1959)

Meteorological - departure of precipitation from “normal”

Agricultural - when the amount of moisture in the soil no longer meets the needs of crop or livestock.

Hydrological - when surface and subsurface water supplies are below normal.

Socioeconomic - when physical water shortages begin to affect people.

Definitions adapted from those provided by the National Weather Service

2000–Present 1895–Present 0–2017

Explore Historical Maps

The U.S. Drought Monitor (2000–present) depicts the location and intensity of drought across the country. Every Thursday, authors from NOAA, USDA, and the National Drought Mitigation Center produce a new map based on their assessments of the best available data and input from local observers. The map uses five categories: Abnormally Dry (D0), showing areas that may be going into or are coming out of drought, and four levels of drought (D1–D4). Learn more.

Time Period (Years): to Update Graph Reset Graph

Latest Available Data:2023-03-21

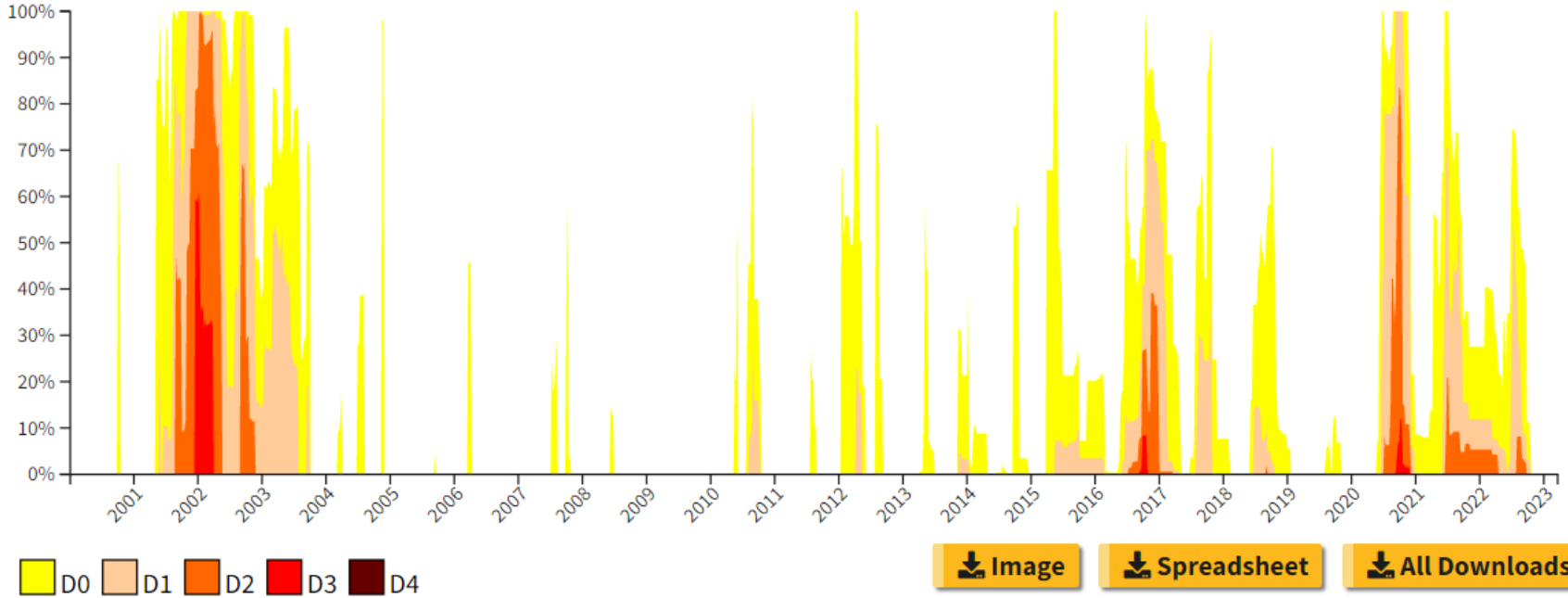


Image Spreadsheet All Downloads

Click or hover on legend boxes to interact with the graph.

The National Integrated Drought Information System (NIDIS): https://www.drought.gov/states/maine

D0 - Abnormally Dry

- Crop growth is stunted; planting is delayed
- Fire danger is elevated; spring fire season starts early
- Lawns brown early; gardens begin to wilt

0.0% of ME (D0–D4)

D1 - Moderate Drought

- Irrigation use increases; hay and grain yields are lower than normal
- Honey production declines
- Wildfires and ground fires increase

0.0% of ME (D1–D4)

D2 - Severe Drought

- Specialty crops are impacted in both yield and fruit size
- Producers begin feeding cattle; hay prices are high
- Warnings are issued on outdoor burns; air quality is poor

0.0% of ME (D2–D4)

D3 - Extreme Drought

- Crop loss is widespread; Christmas tree farms are stressed; dairy farmers are struggling financially
- Well drillers and bulk water haulers see increased business
- Water recreation and hunting are modified; wildlife disease outbreak is observed

0.0% of ME (D3–D4)

D4 - Exceptional Drought

- Maine has experienced little or no exceptional (D4) drought, so there are no D4-level drought impacts recorded in the Drought Impact Reporter.

0% of ME (D4)

2023 is the…

11th

driest February on record, over the past 129 years

↓ 1.4138

inches from normal

38th

wettest year to date over the past 129 years (January-February 2023)

↑ 0.6426

inches from normal

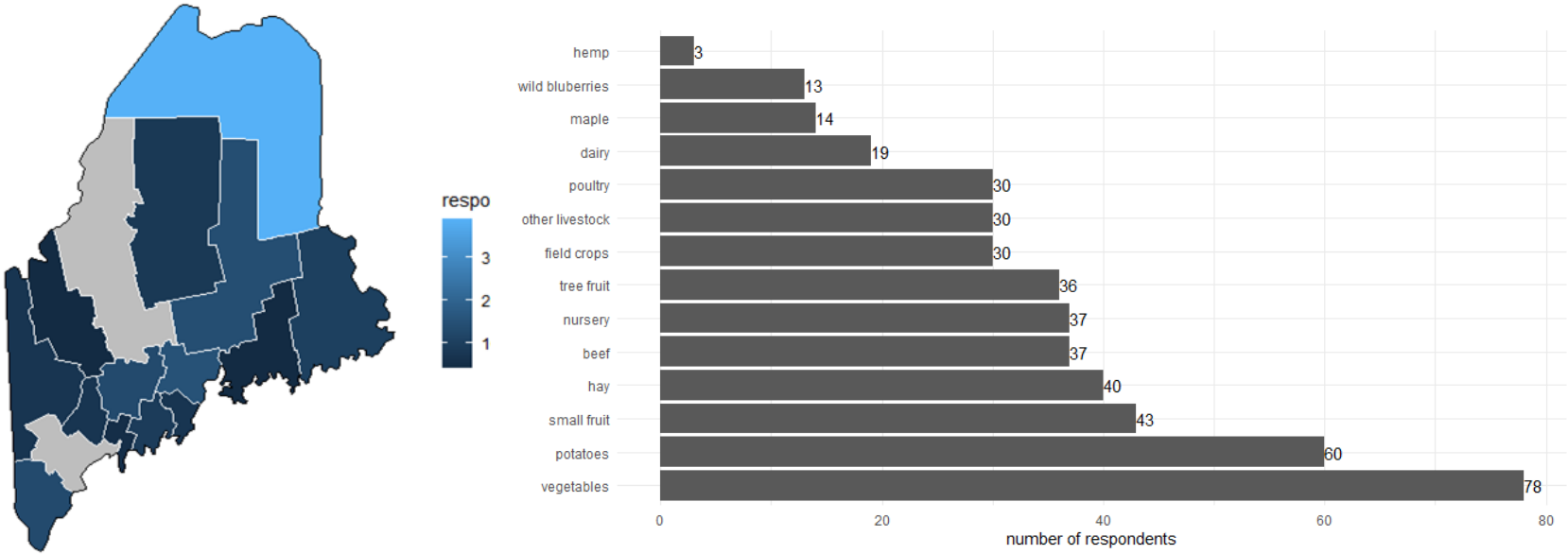
NOAA NIDIS **Drought.gov**

National Integrated Drought Information System

https://www.drought.gov/states/Maine

How did farmers in Maine experience the 2020 drought?

The 2020 Maine Agriculture and Drought Survey (n = 174 valid responses)



Schattman, R. E., Goossen, C., and Calderwood, L. 2021. The 2020 Maine Drought and Agriculture Report. University of Maine, Orono. 1-30. DOI: 10.6084/m9.figshare.14474055

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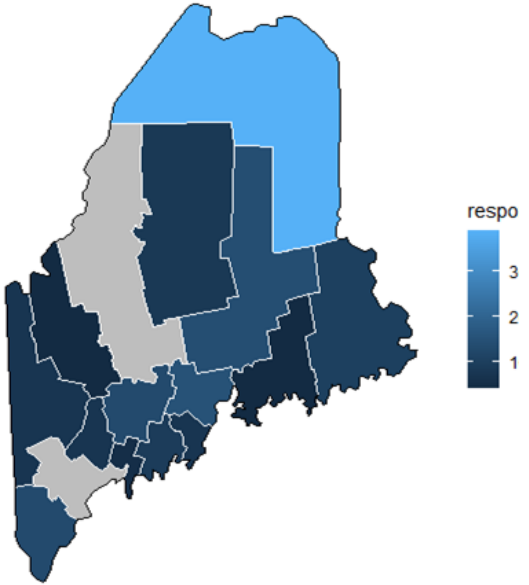


Summary demographics and farm characteristics

- Average age: 52 years
- Gender identity (F:M:other or no answer): 26%:73%:1%
- Median farm size: 55 acres
- Median irrigated area: 1 acre
- Race/ethnicity: 97% white/non Hispanic; 1 person identifying as Indigenous American or Alaska Native

Schattman, R. E., Goossen, C., and Calderwood, L. 2021. The 2020 Maine Drought and Agriculture Report. University of Maine, Orono. 1-30. DOI: 10.6084/m9.figshare.14474055

Photo credit: Jeff Tuttle/Reuters

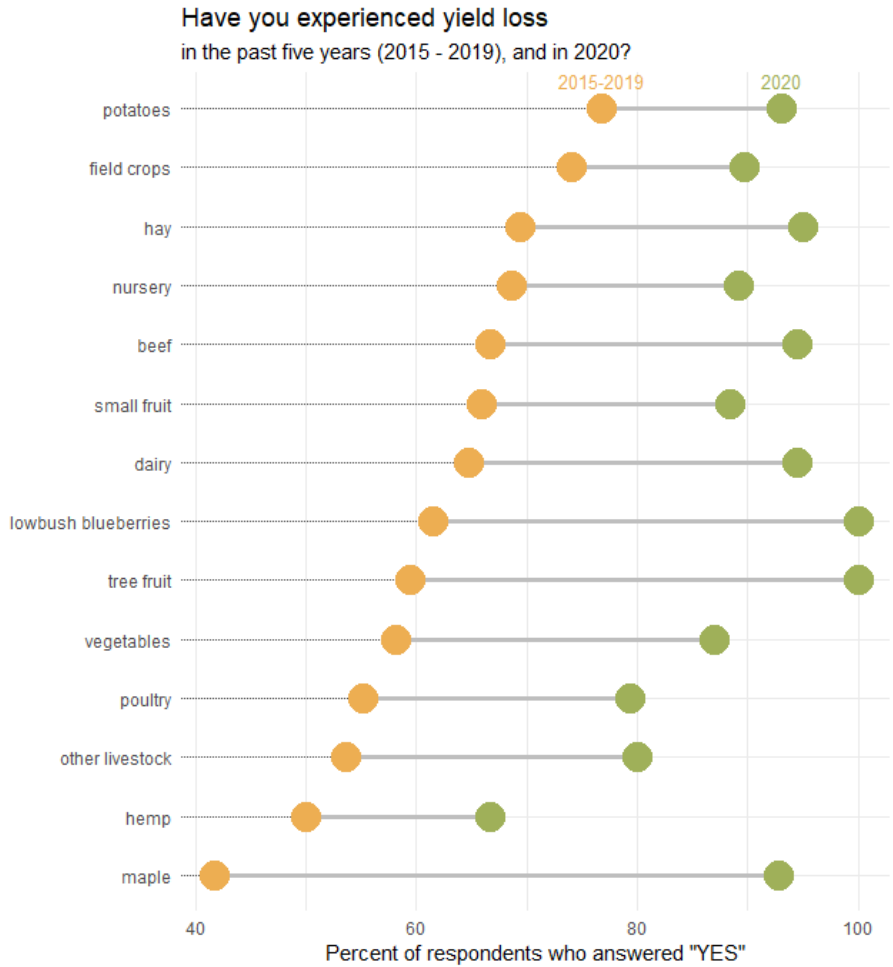
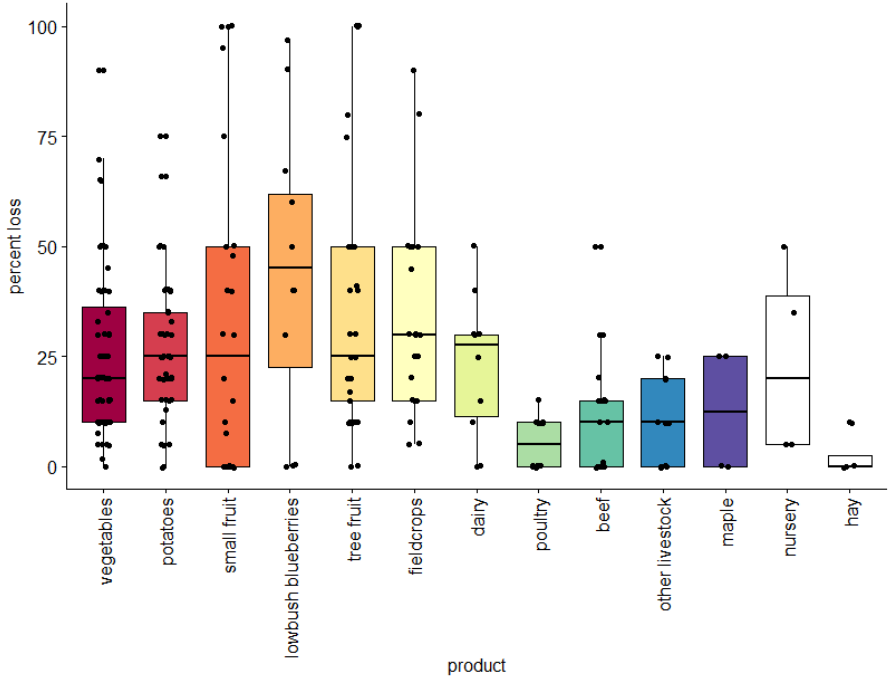
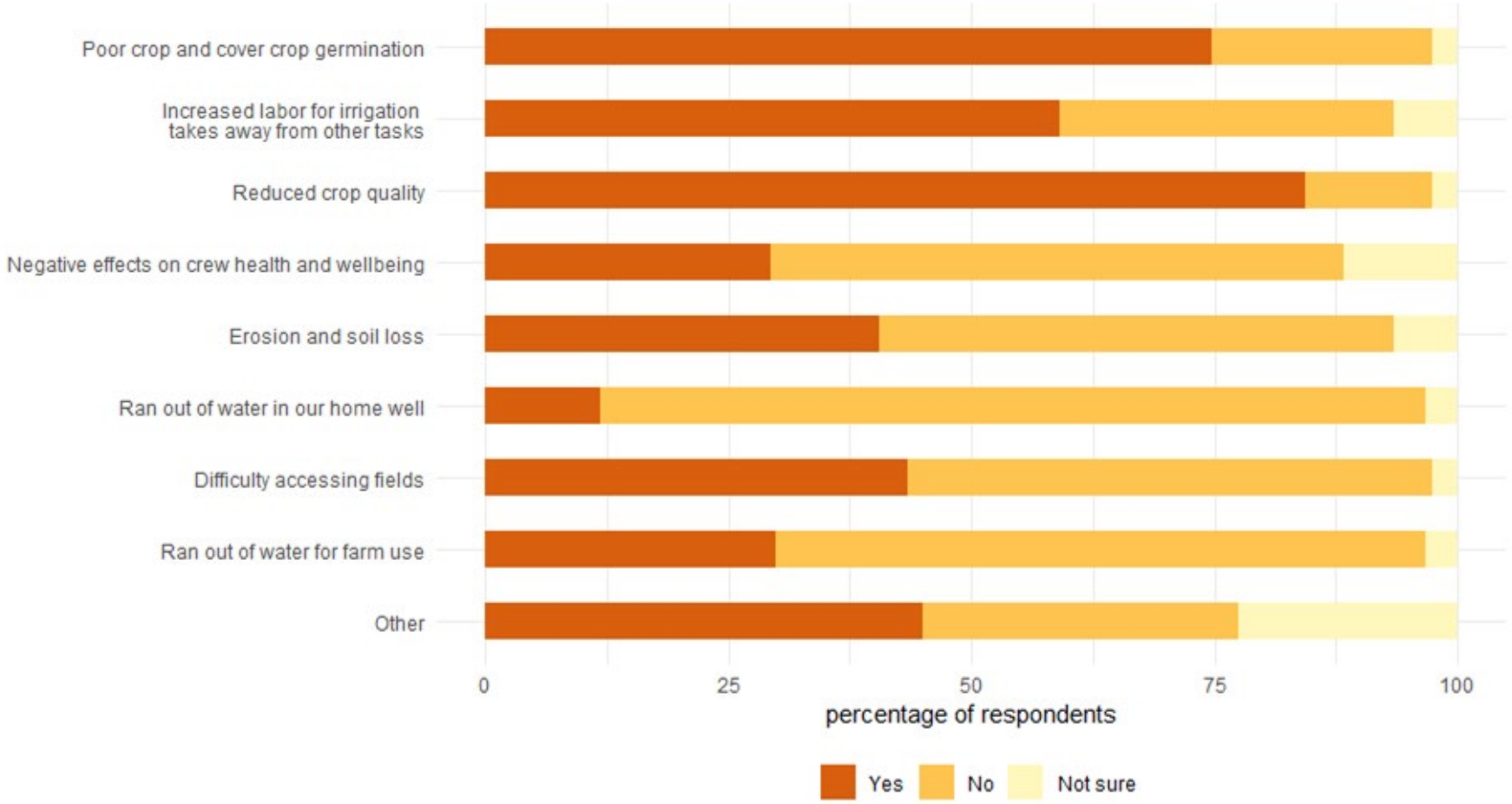


Photo credit: Jeff Tuttle/Reuters

Producer estimated losses relative to expected yield, due to the 2020 drought or other causes



Effects beyond decreased yield



Three components of on-farm water management

1. Design and implementation of water source and delivery systems
2. Regulatory compliance
3. Navigation of the constraints of agroecosystems

Three components of on-farm water management

1. Design and implementation of water source and delivery systems
2. Regulatory compliance
3. Navigation of the constraints of agroecosystems

Research Question 1

What kind of support (i.e., information, technical assistance or financial assistance) do farmers want related to agricultural water management?

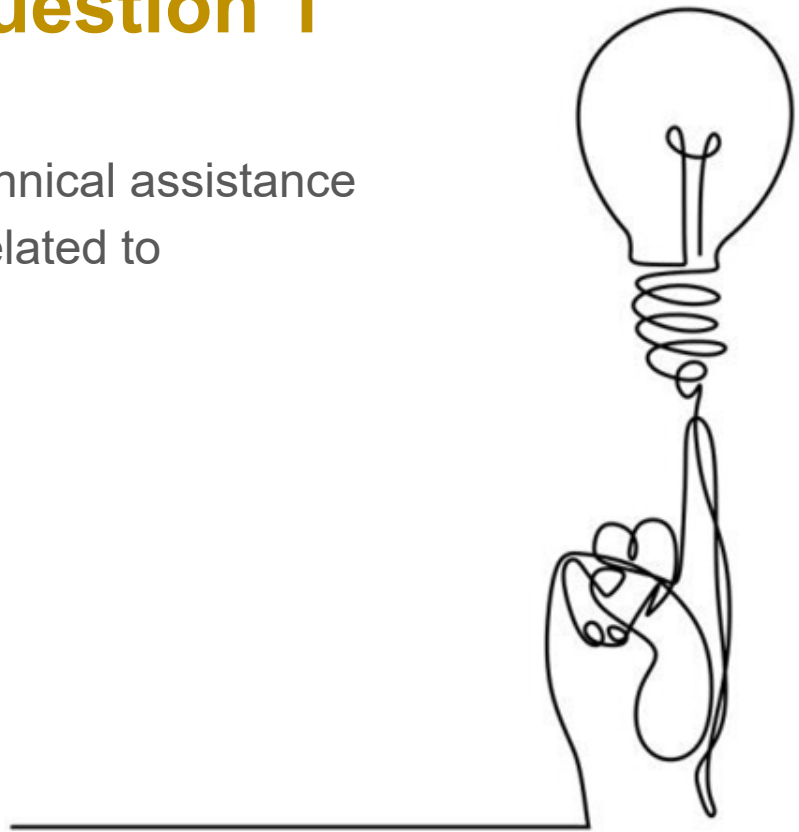


Image credit: ngupakarti

On-farm practices


Remediating compaction


Planting or adjusting planting schedules


Improving soil health


Crop and variety selection


Covered production


Cover cropping


Conservation tillage / no till


Shallow well installation


Deep well installation

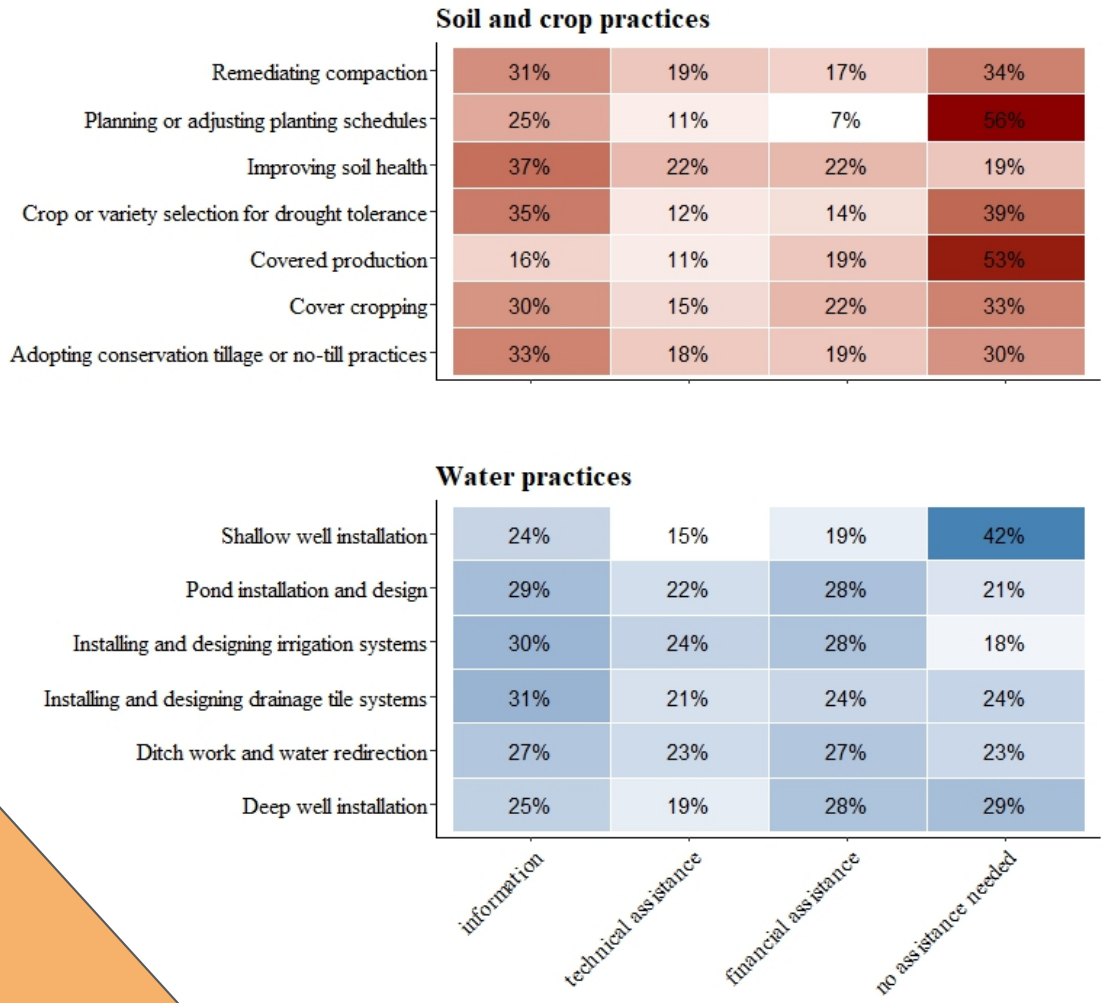

Pond installation and design


Irrigation installation and design


Drain tile installation and design

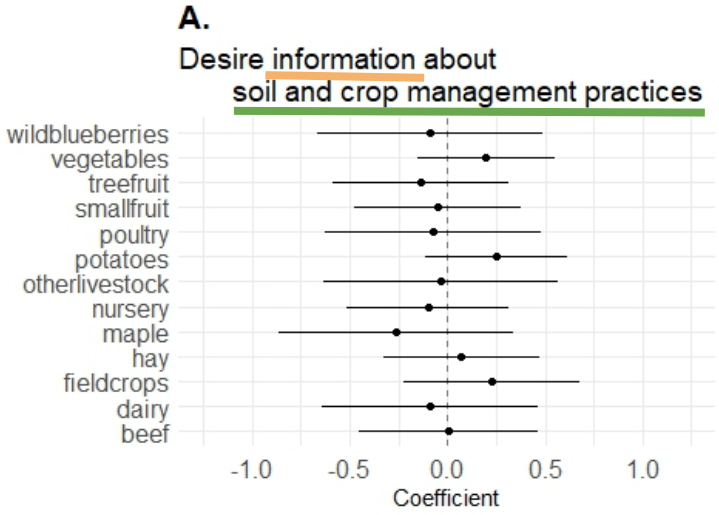

Ditch work and water redirection

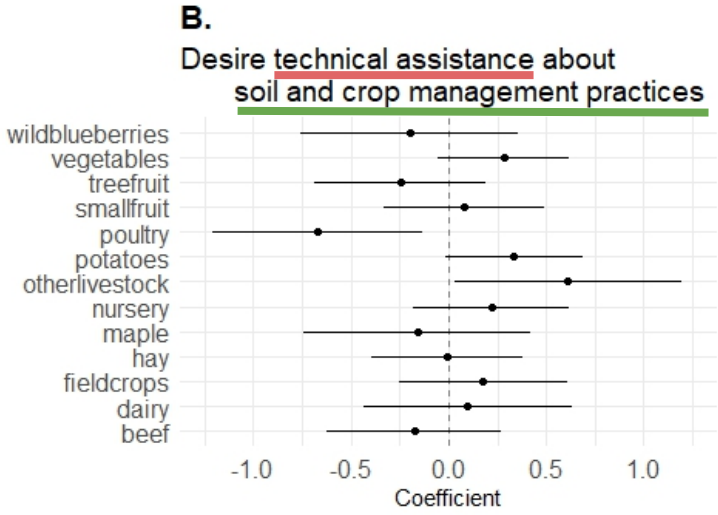
Types of assistance respondents desire

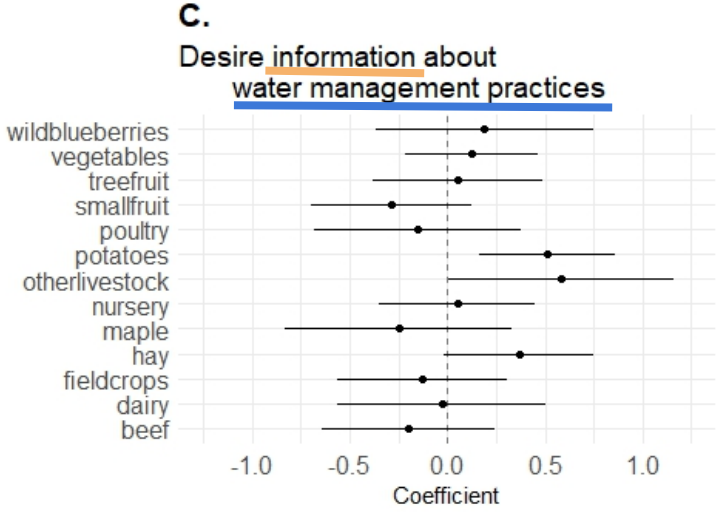


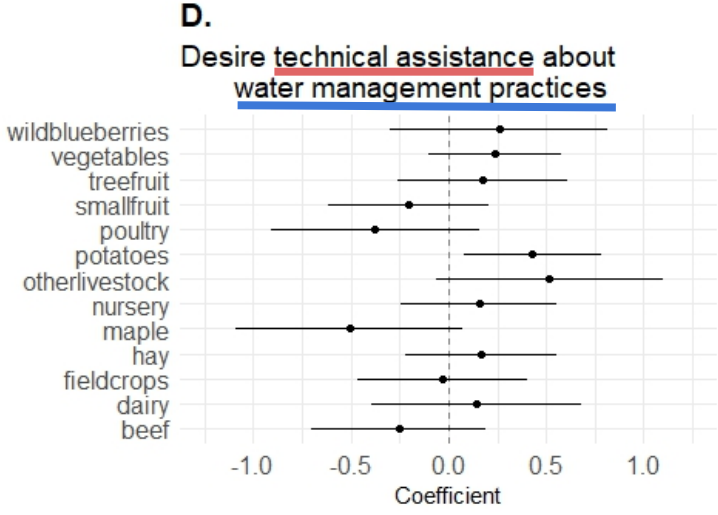
Percentages in cells indicate proportion of respondents who selected each option

Where is there the most interest / need?

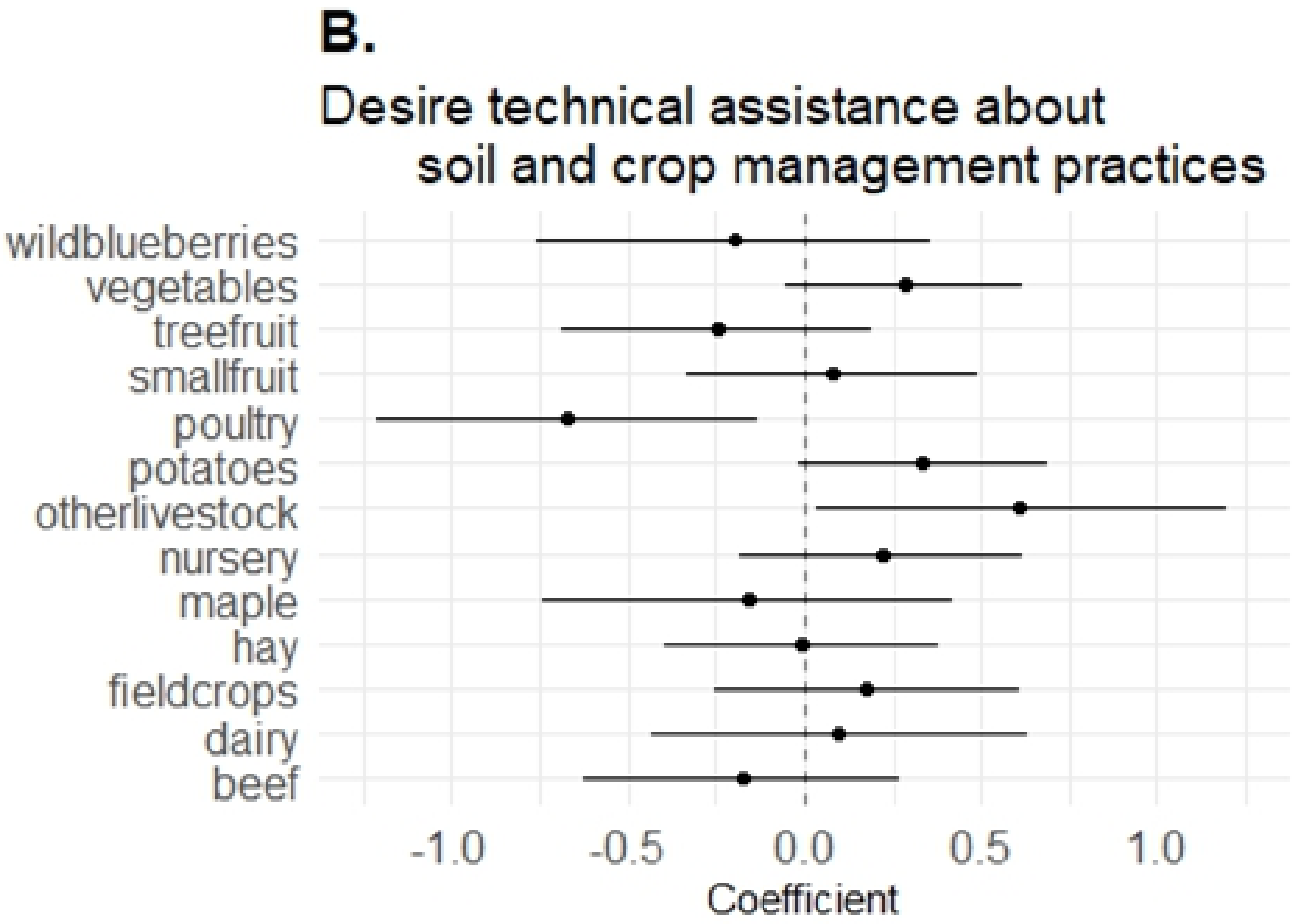








Dots indicate point estimates for the beta coefficients; bars indicate the 95% confidence interval



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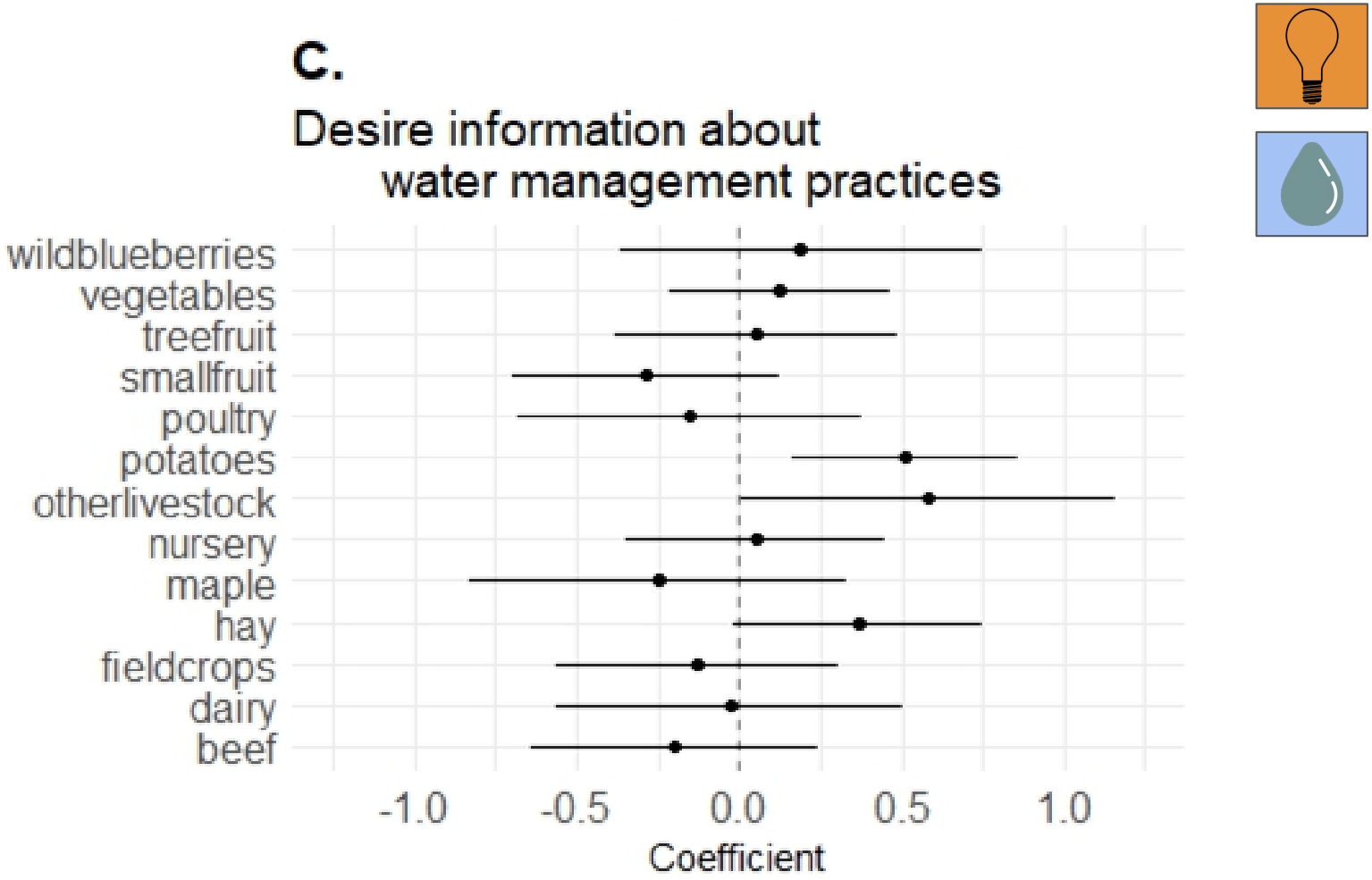

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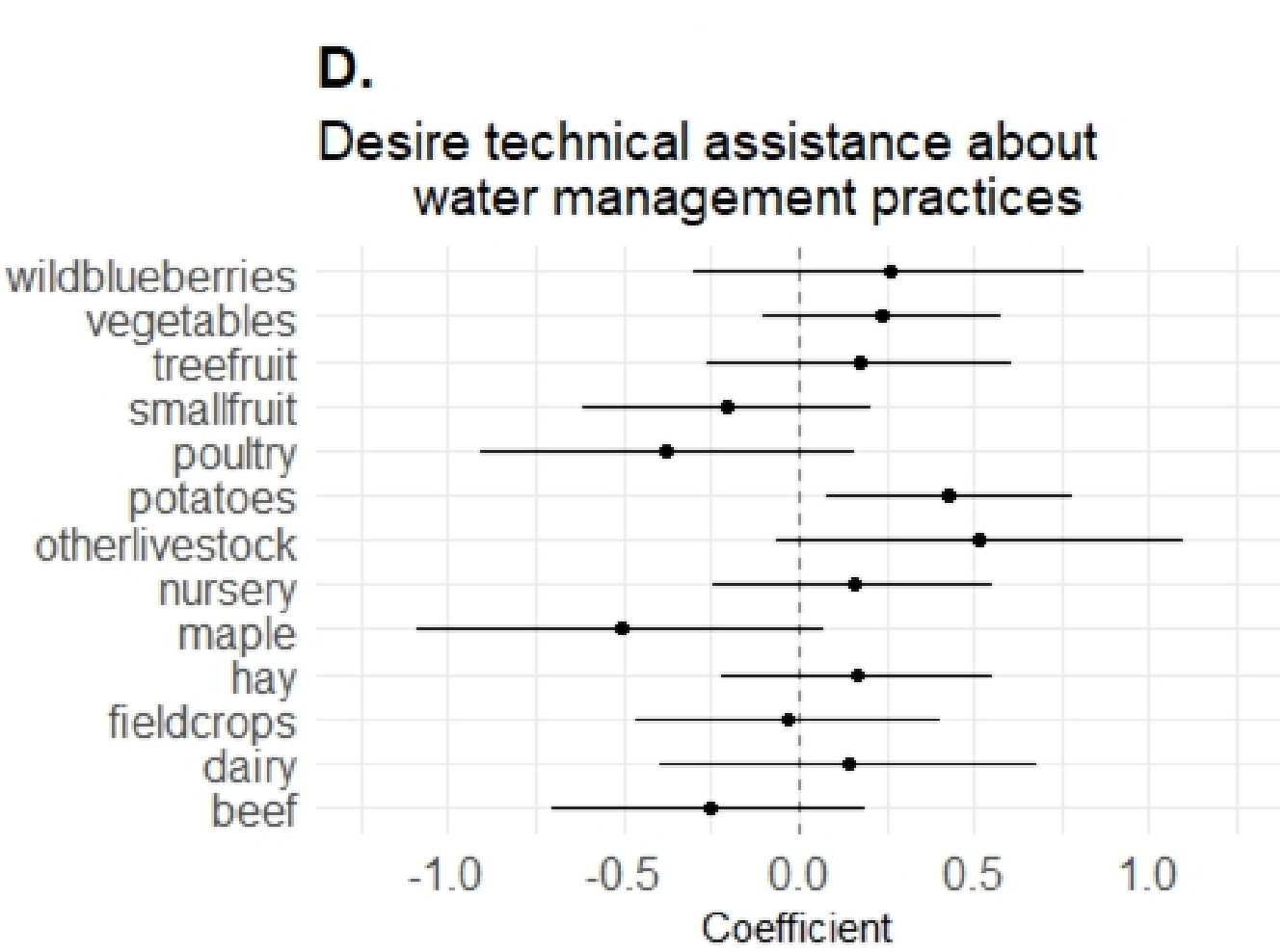

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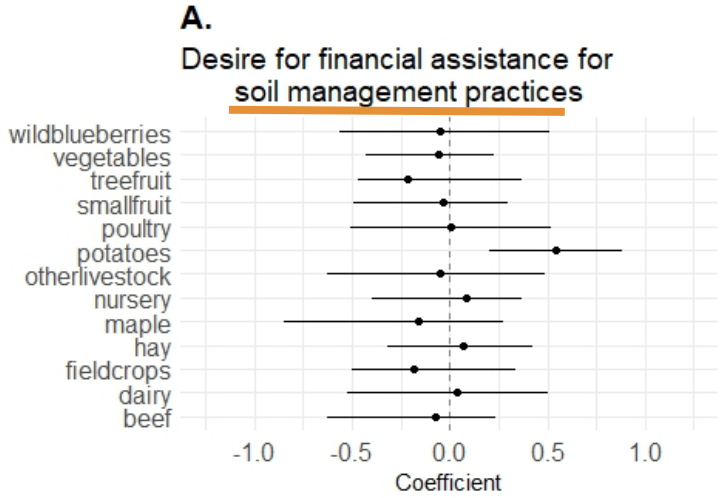

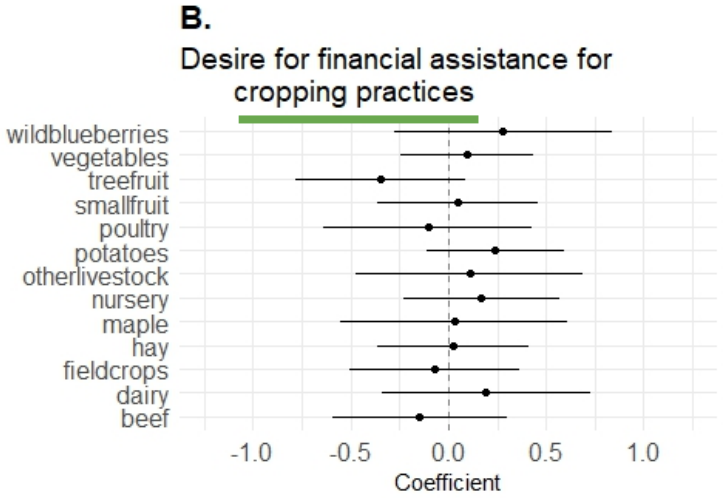

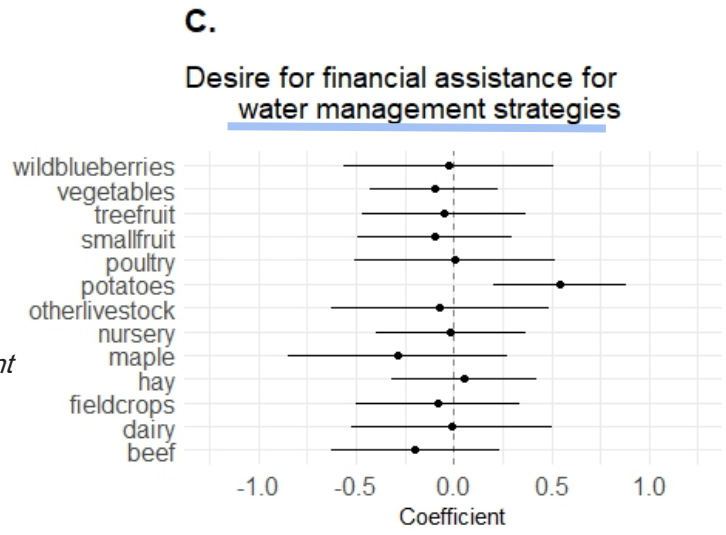

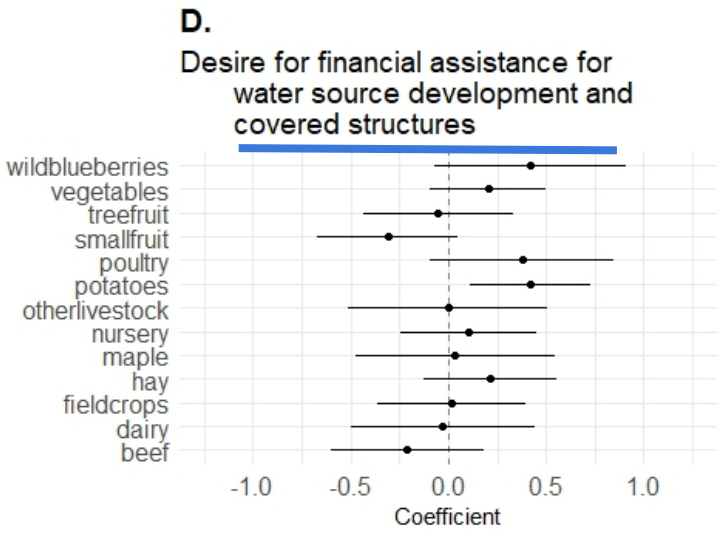

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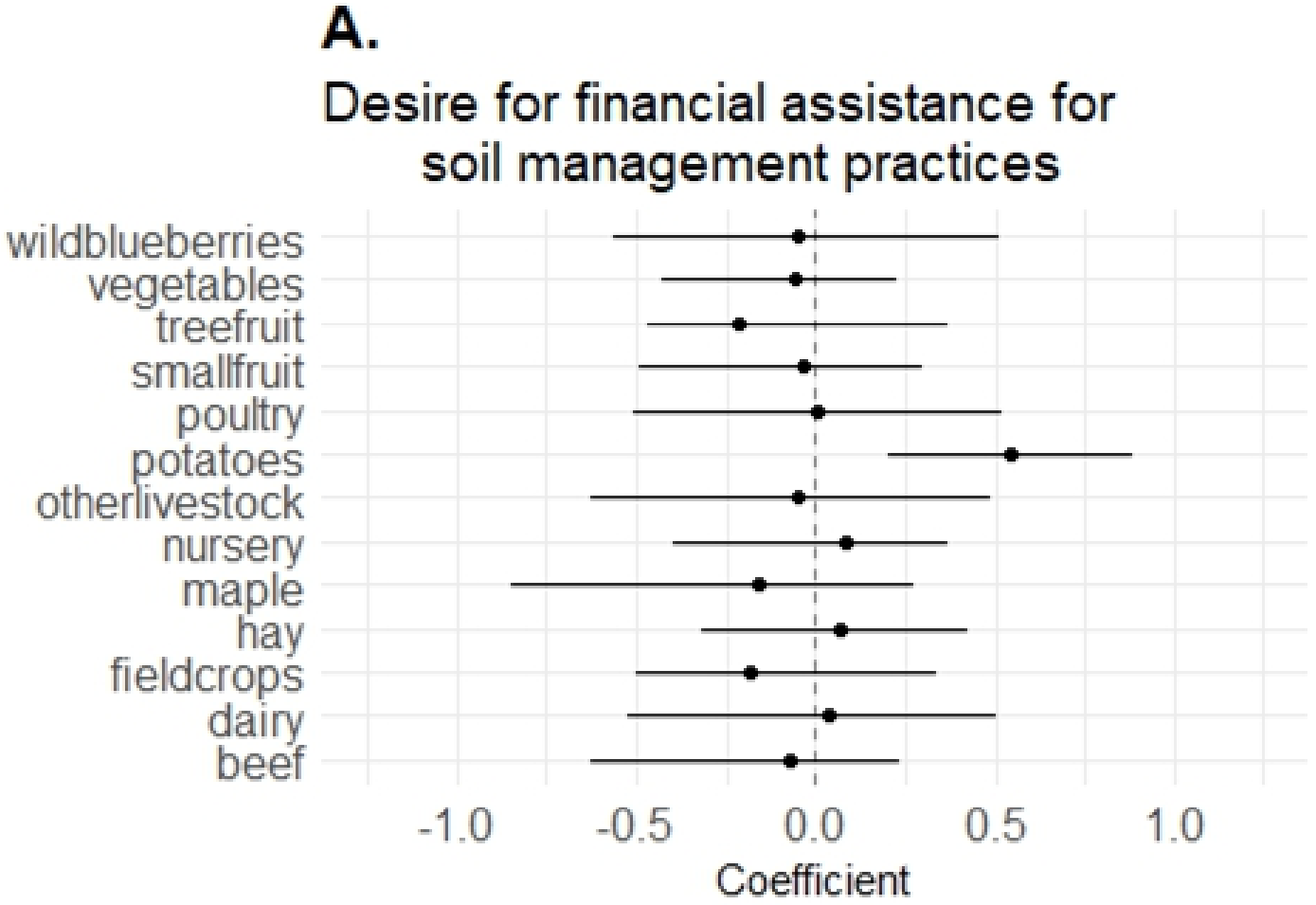

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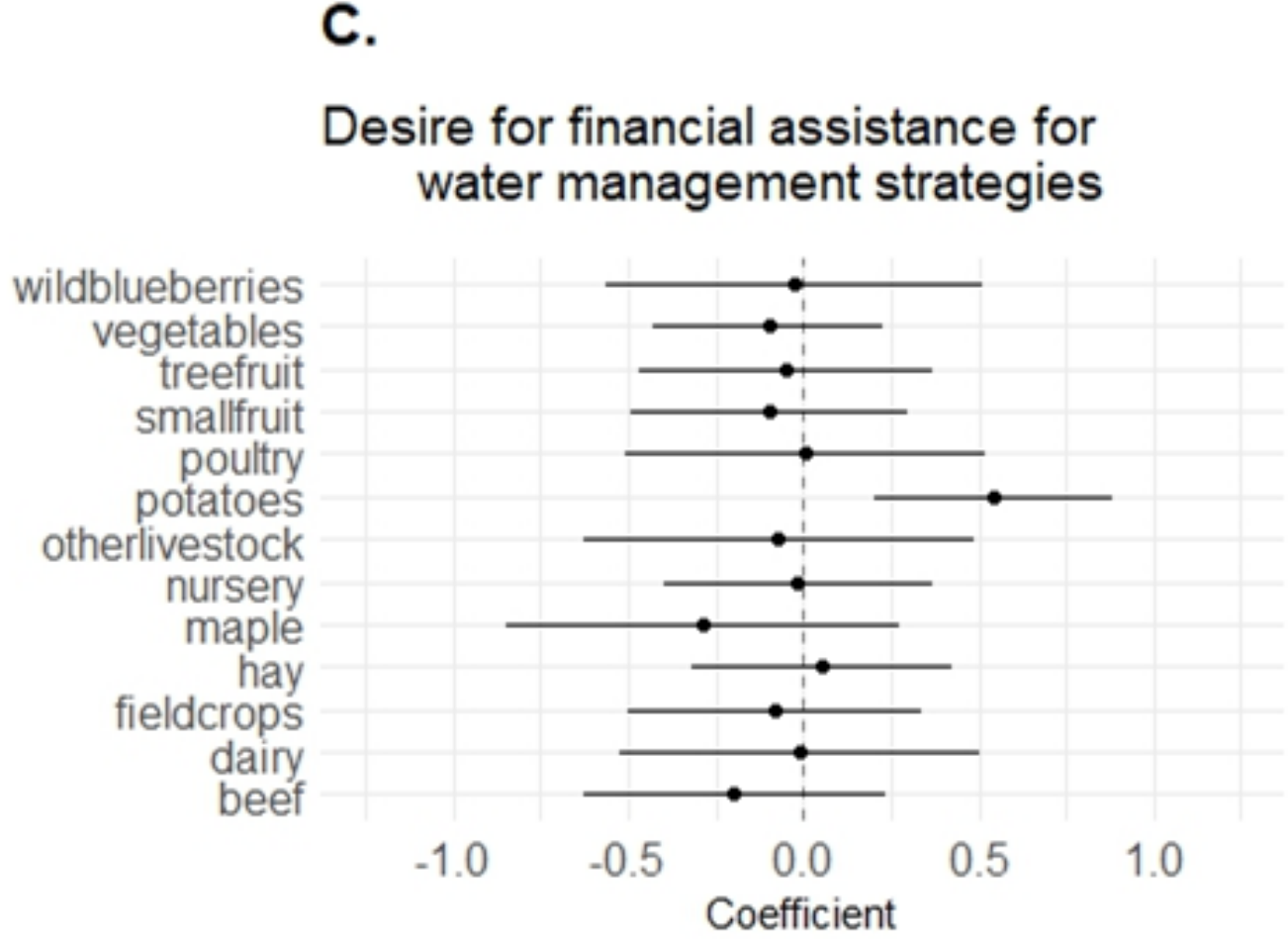

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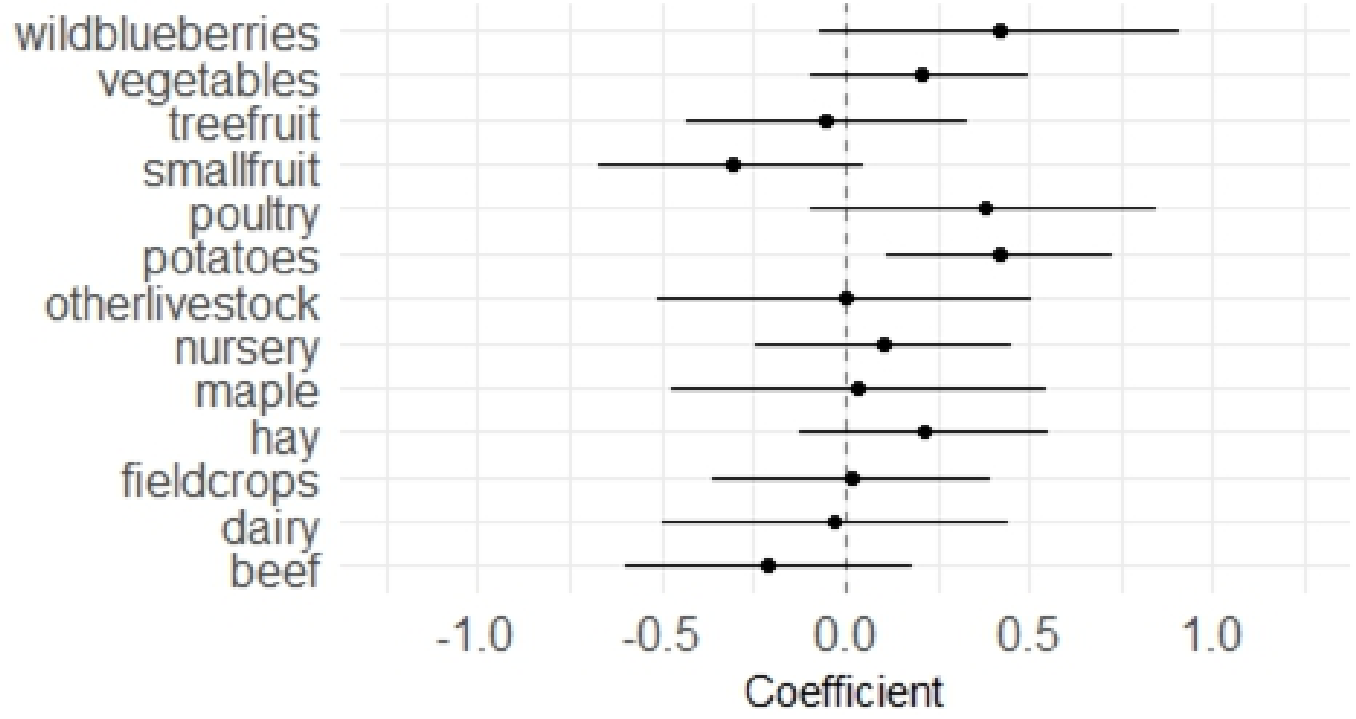
D.

Desire for financial assistance for water source development and covered structures



Dots indicate point estimates for the beta coefficients; bars indicate the 95% confidence interval

Key takeaways

- ★ Recent droughts have challenged farmers in Maine in multiple ways, including compromised yield, reduced crop quality, reduced germination, and more.

Key takeaways

- ★ Between 16-37% of farmer respondents desire more **information** about **crop and soil practices** *and* **water management practices**.
  - There is fairly uniform desire for **soil and crop information** reported by farmers across sectors.
  - Producers of potatoes and other livestock expressed stronger interest in receiving **information about water management** than other producers in this area.

Other livestock = pork, duck, sheep, goat, or anything that is not beef or chicken…

Key takeaways

- ★ Between 11-24% of farmers desire **technical assistance** about crop and soil practices *and* water management practices.
  - Potato growers and those who raise other livestock are more interested than other farmers in receiving **technical assistance** about **water management practices**.
  - Livestock producers were significantly more interested than other types of producers in receiving **technical assistance** about **crop and soil management.**

Key takeaways

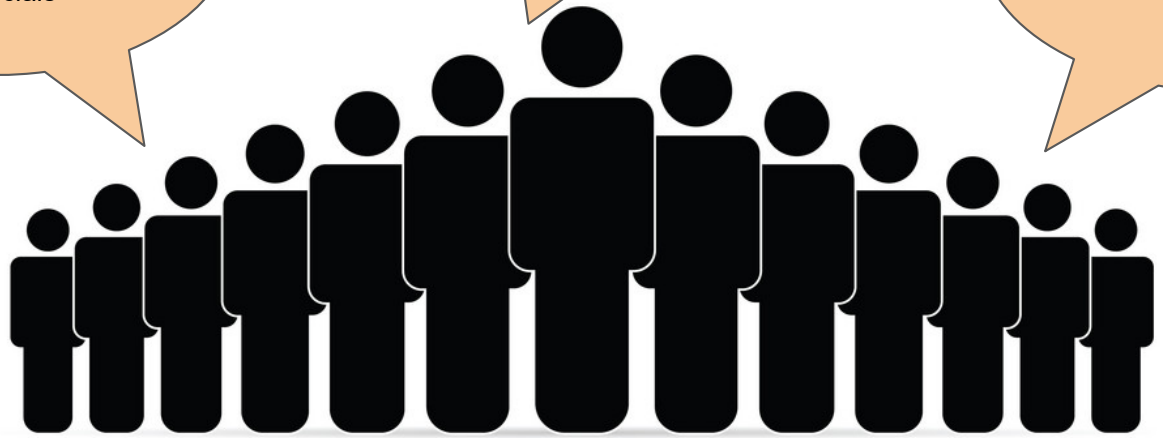
- ★ Between 7-28% of farmer respondents were interested in receiving **financial assistance** related to crop and soil practices *and* water management practices.
  - Respondents producing potatoes expressed a stronger desire than other respondents for **financial assistance** for **soil management strategies**, **water management practices**, and **water source development and covered structures.**

Agricultural advisors are…

Public sector advisors
Extension professionals
State agencies
Federal agencies
Municipal officials

Private sector advisors
Certified crop consultants
Seed, feed, equipment dealers
Well drillers, electricians, plumbers, other tradespersons

Non-profit advisors
Industry associations
Membership organizations



Advisor expertise is more important to farmers than what organization they work for (Sutherland et al. 2013)

Who is on a farmers' team?

Research Question 2

What knowledge and skills do advisors believe farmers currently possess?

Are advisors confident in providing farmers with recommendations around water management practices?

Image credit: ngupakarti

What do advisors think about drought and agriculture?

The 2021 Northeast Agricultural Advisor Survey (n = 381 valid responses)

Summary demographics and farm characteristics

Average age: 47 years

Gender identity (M:F:other or did not answer): 53%:42%:3%

Reported serving a median of 5 agricultural sectors (max 12 sectors)

54 respondents from Maine

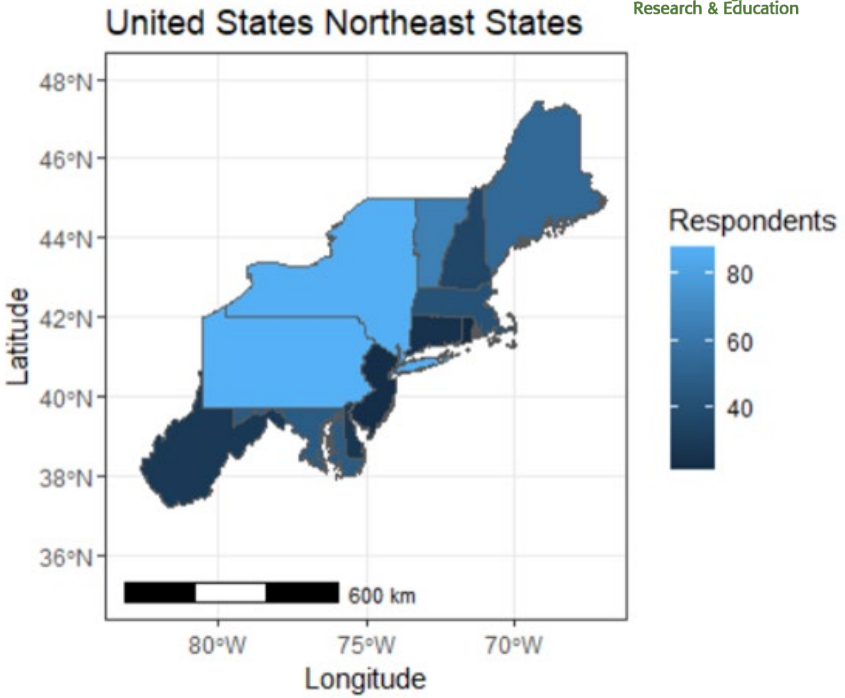
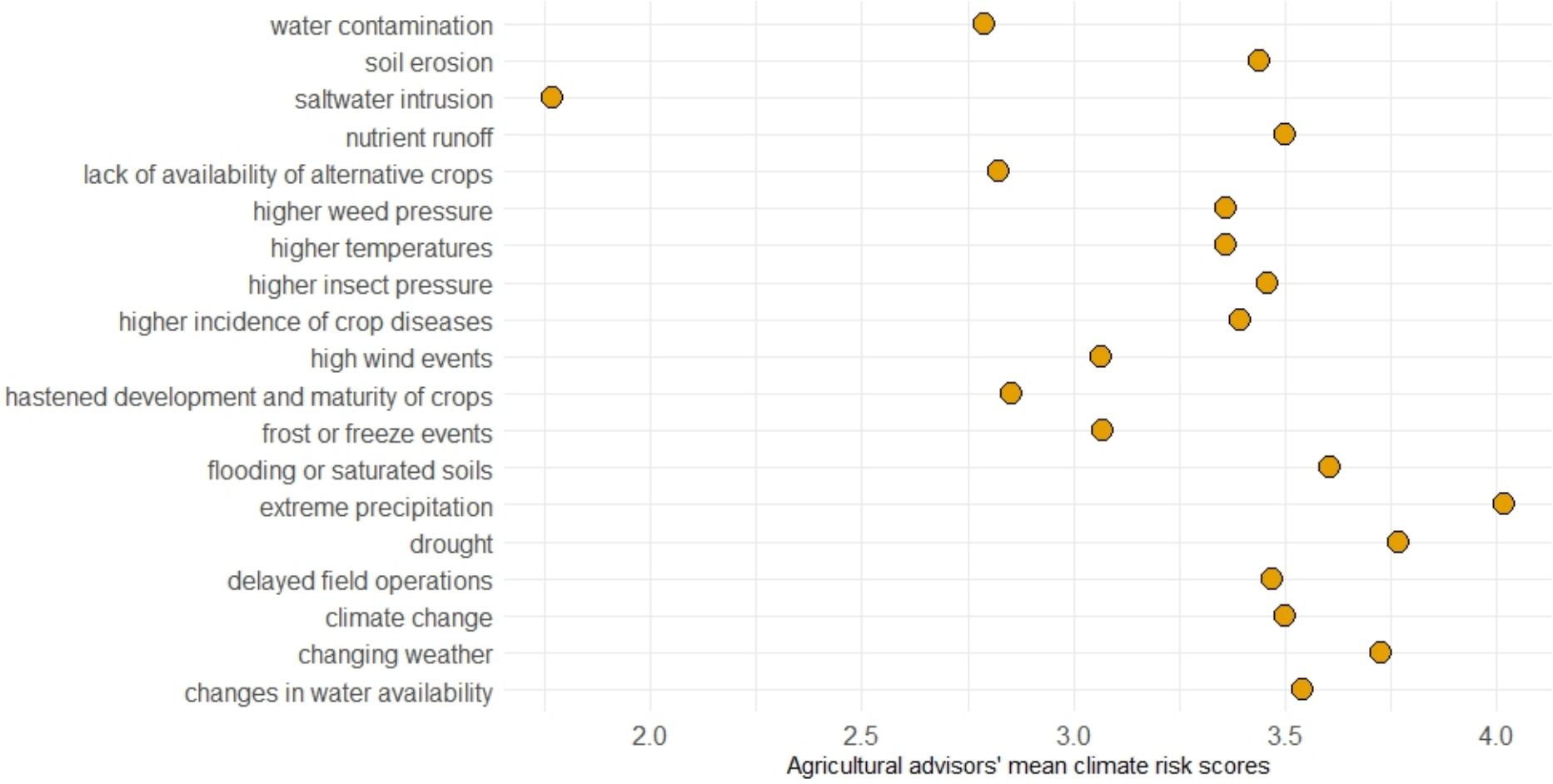


Photo credit: Telegraph and Gazette

Sector	n (% of sample)
Vegetables	260 (68%)
Potatoes	114 (30%)
Small fruit	169 (44%)
Wild blueberries	39 (10%)
Tree fruit	159 (42%)
Field crops	242 (64%)
Dairy	243 (64%)
Poultry	167 (44%)
Beef	240 (63%)
Other livestock	182 (48%)
Maple	93 (24%)
Other	205 (54%)

Shaded rows = > 50% of respondents reported working with farmers in this sector

Agricultural advisors' perceptions of risk related to climate change and/or changing weather patterns. (1 = no risk; 5 = severe risk). Dots indicate mean scores for each risk factor.



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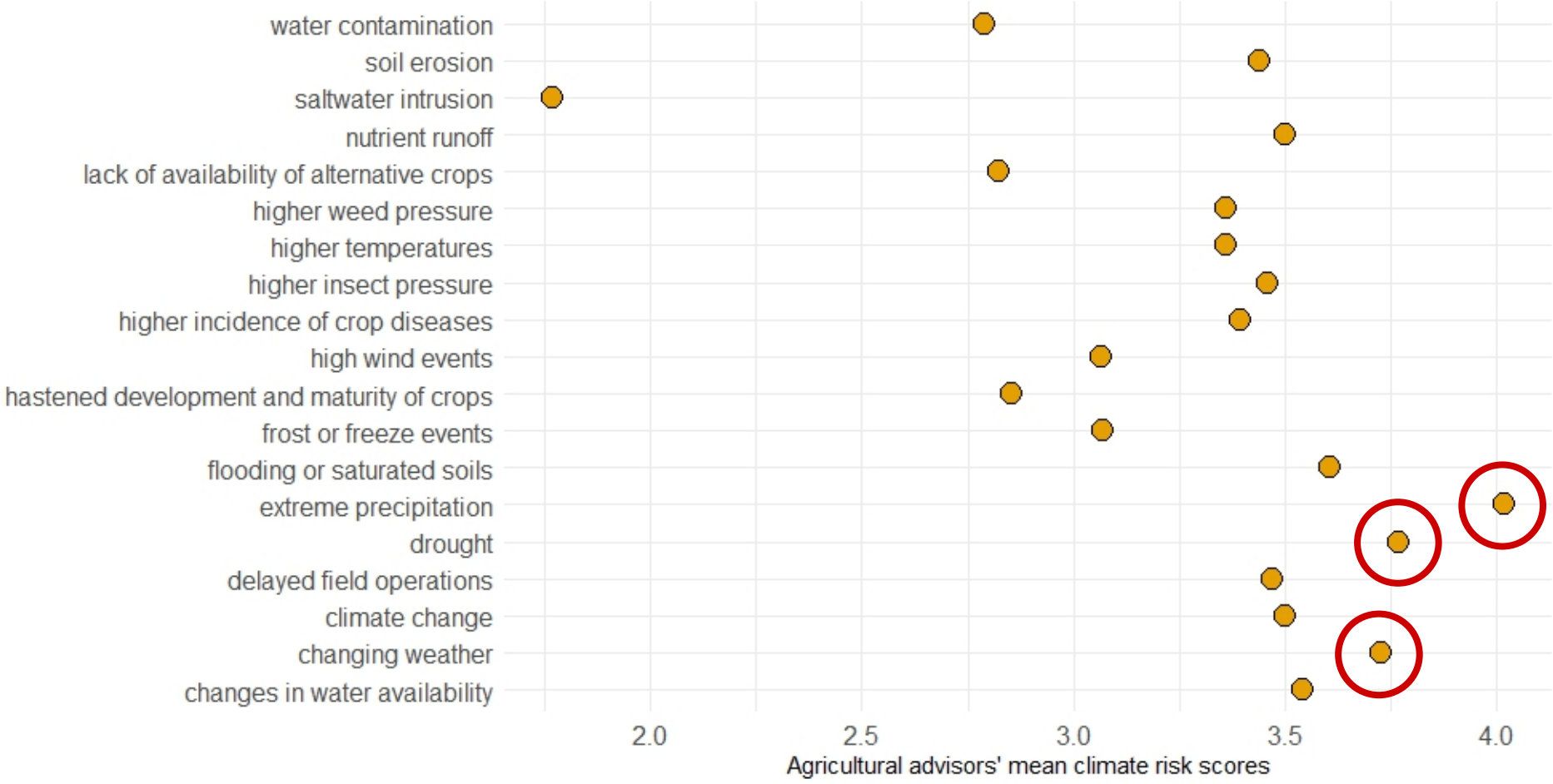


On-farm practices


Remediating compaction


Planting or adjusting planting schedules


Improving soil health


Crop and variety selection


Covered production


Cover cropping


Conservation tillage / no till


Shallow well installation


Deep well installation


Pond installation and design

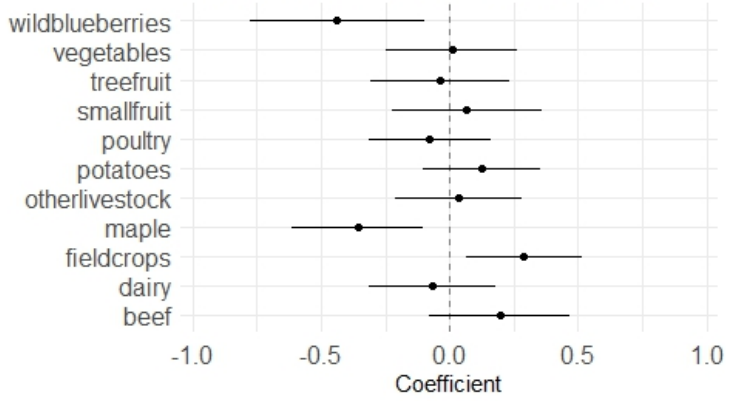

Irrigation installation and design


Drain tile installation and design


Ditch work and water redirection

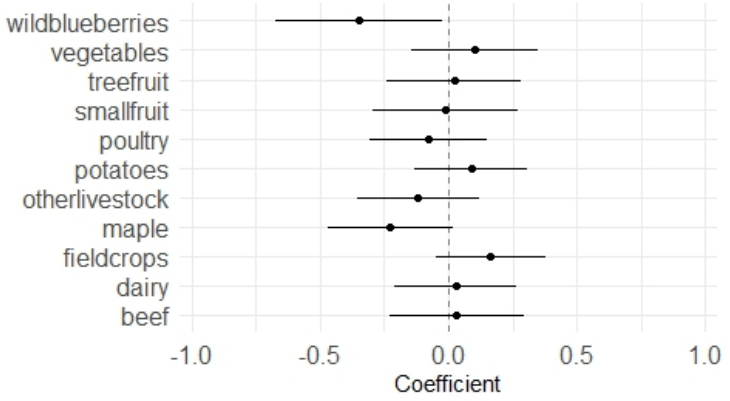
A.

Perception that farmers have the skills and knowledge they need to be successful, related to soil management practices



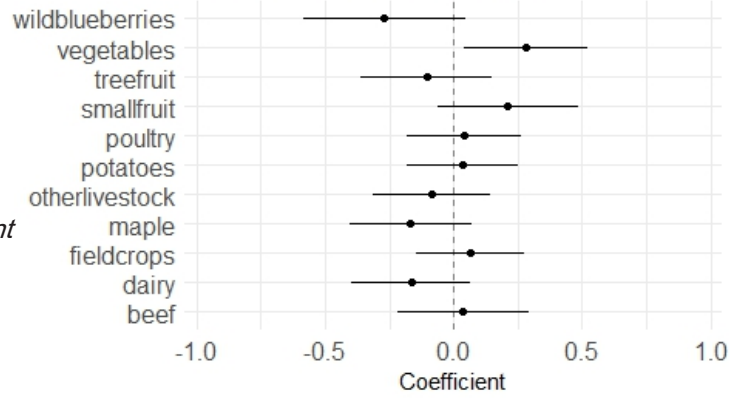
B.

...cropping practices



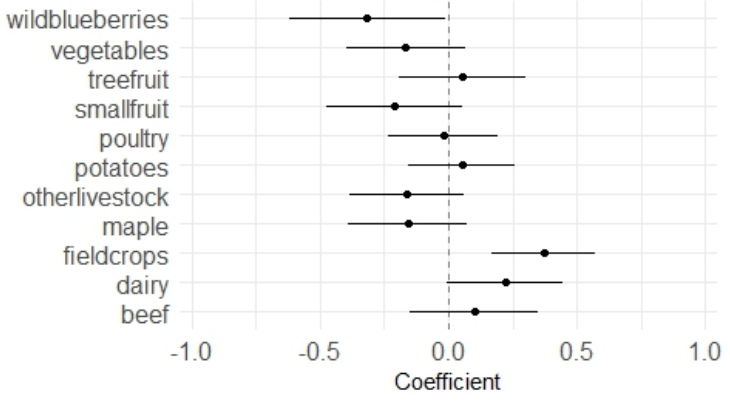
C.

...water source development

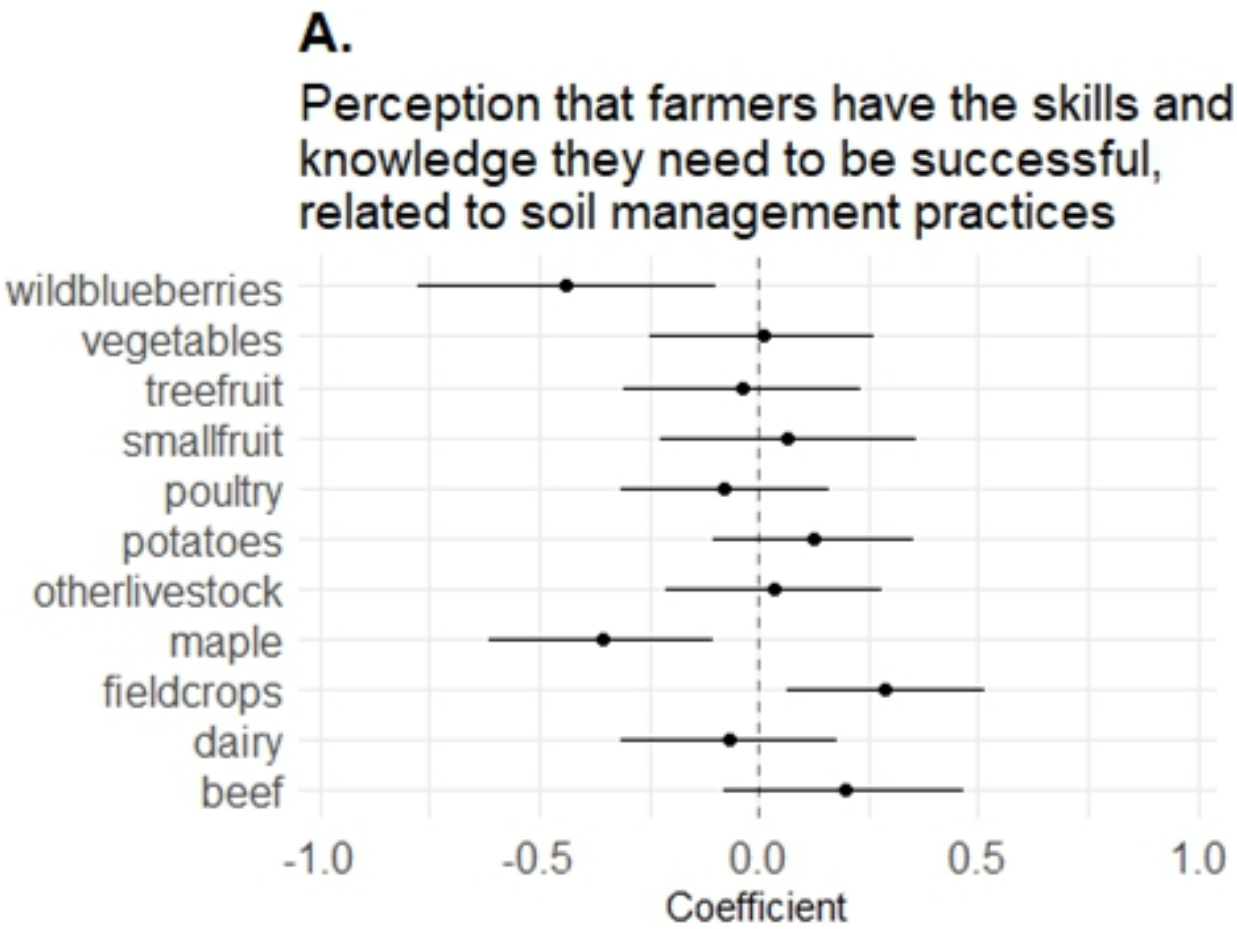


D.

...excess water management



Dots indicate point estimates for the beta coefficients; bars indicate the 95% confidence interval



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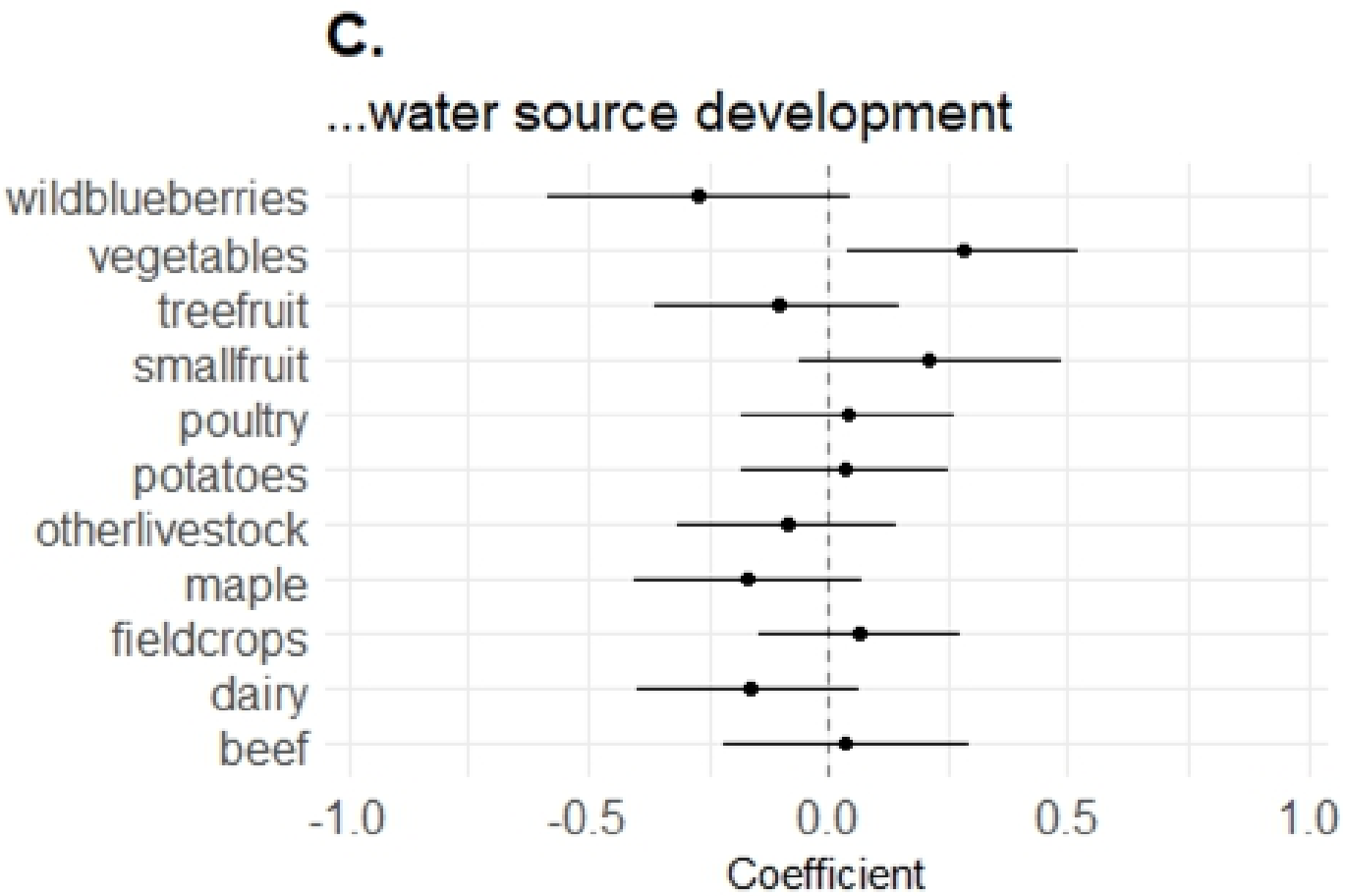

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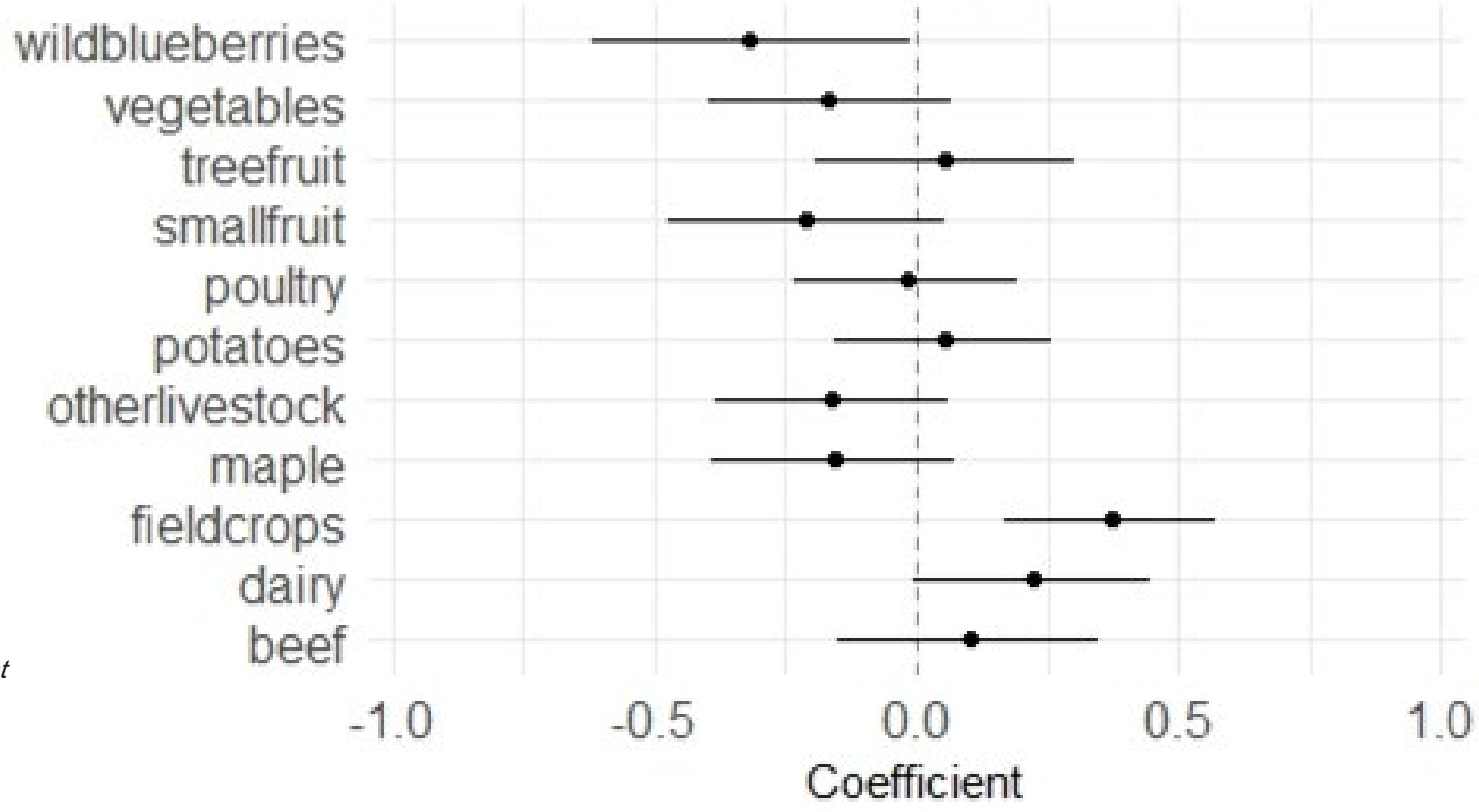

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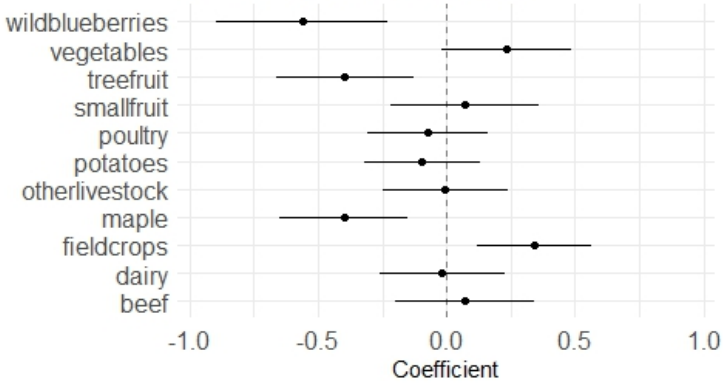
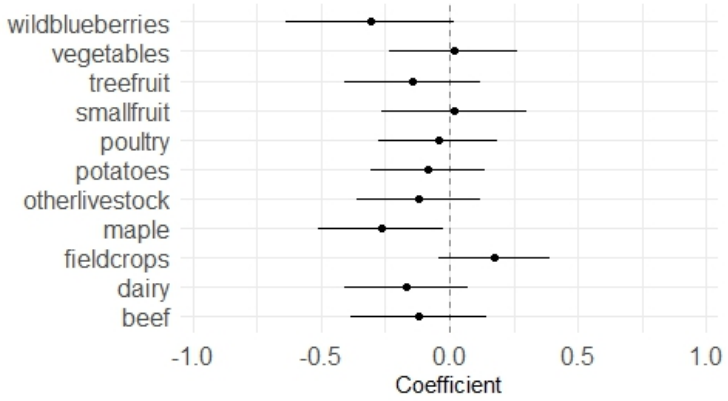
A.

Agricultural advisor confidence providing reccomendations around soil management practices



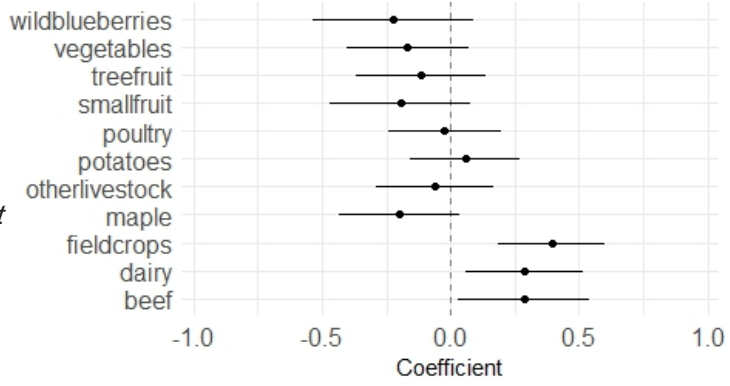
B.

...cropping practices



C.

...excess water management and water source development



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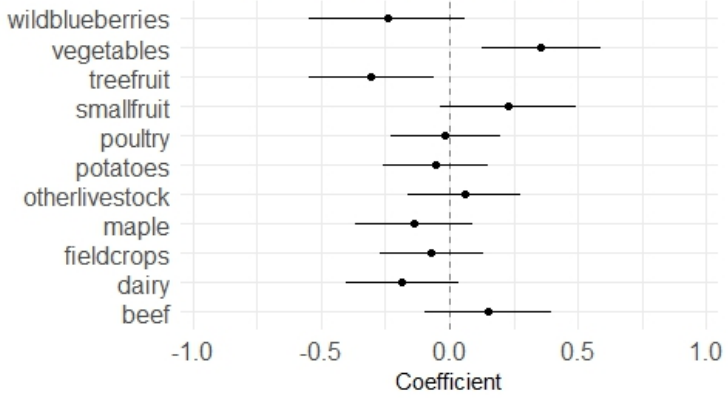
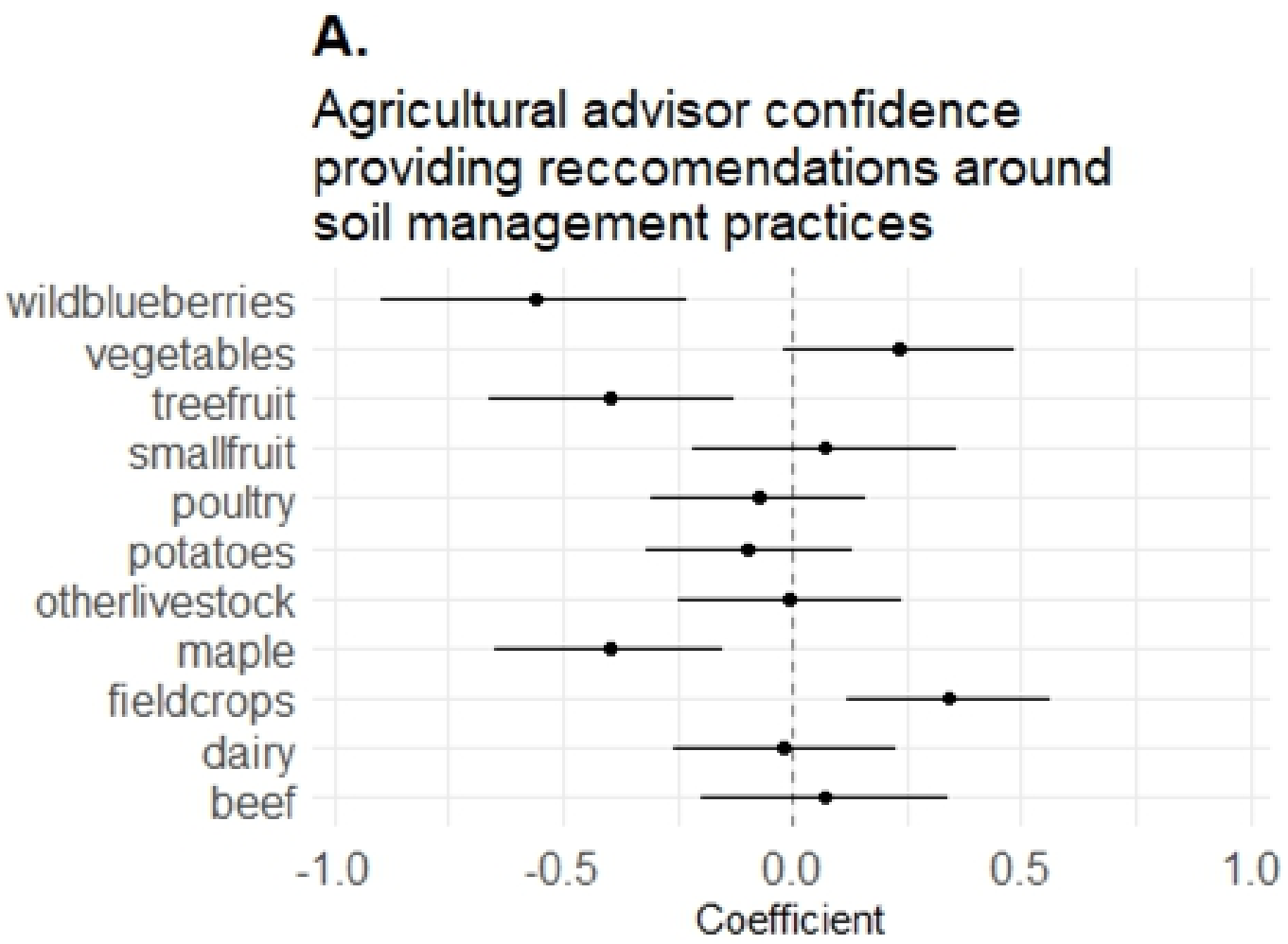
D.

...irrigation and covered structures





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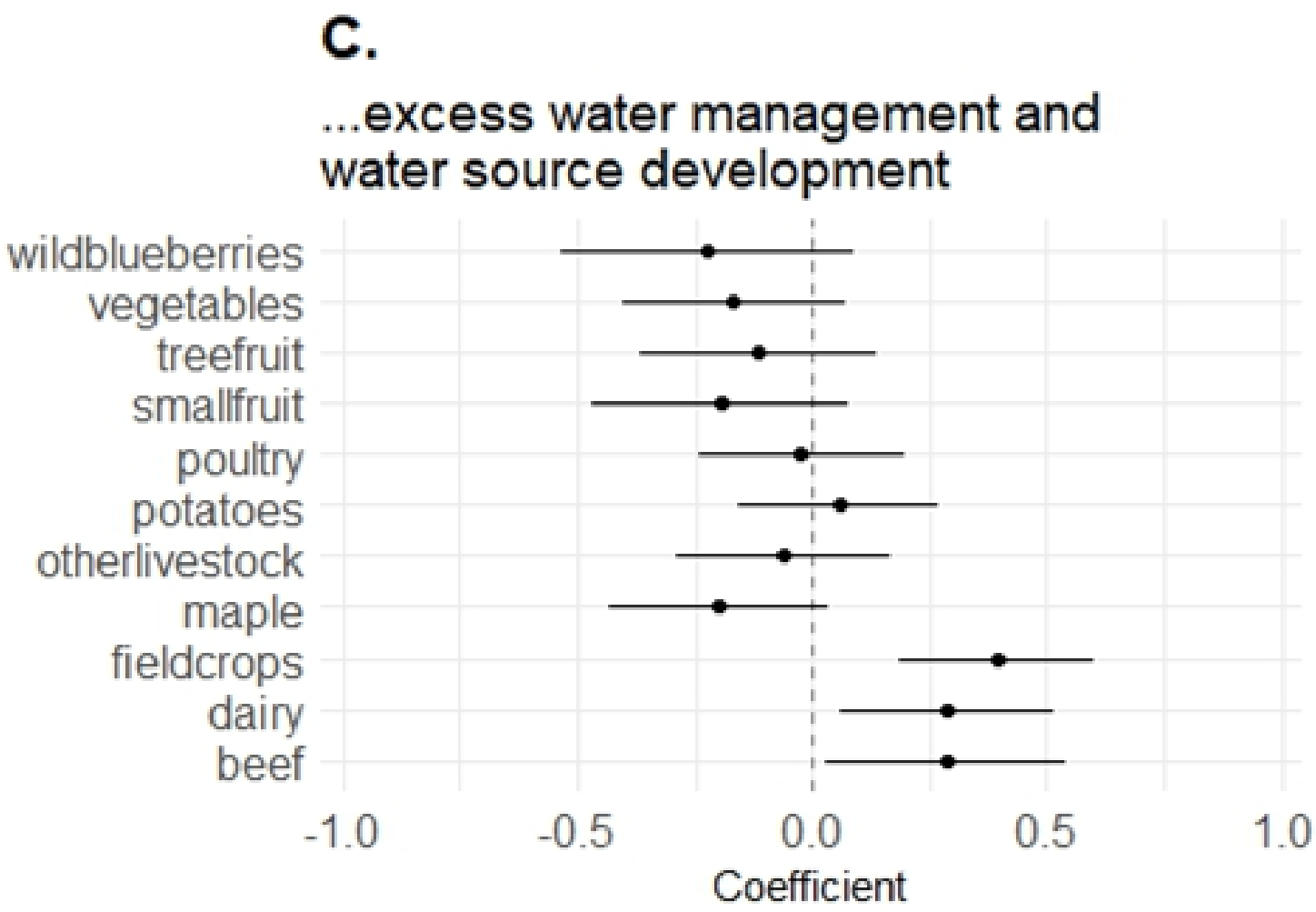

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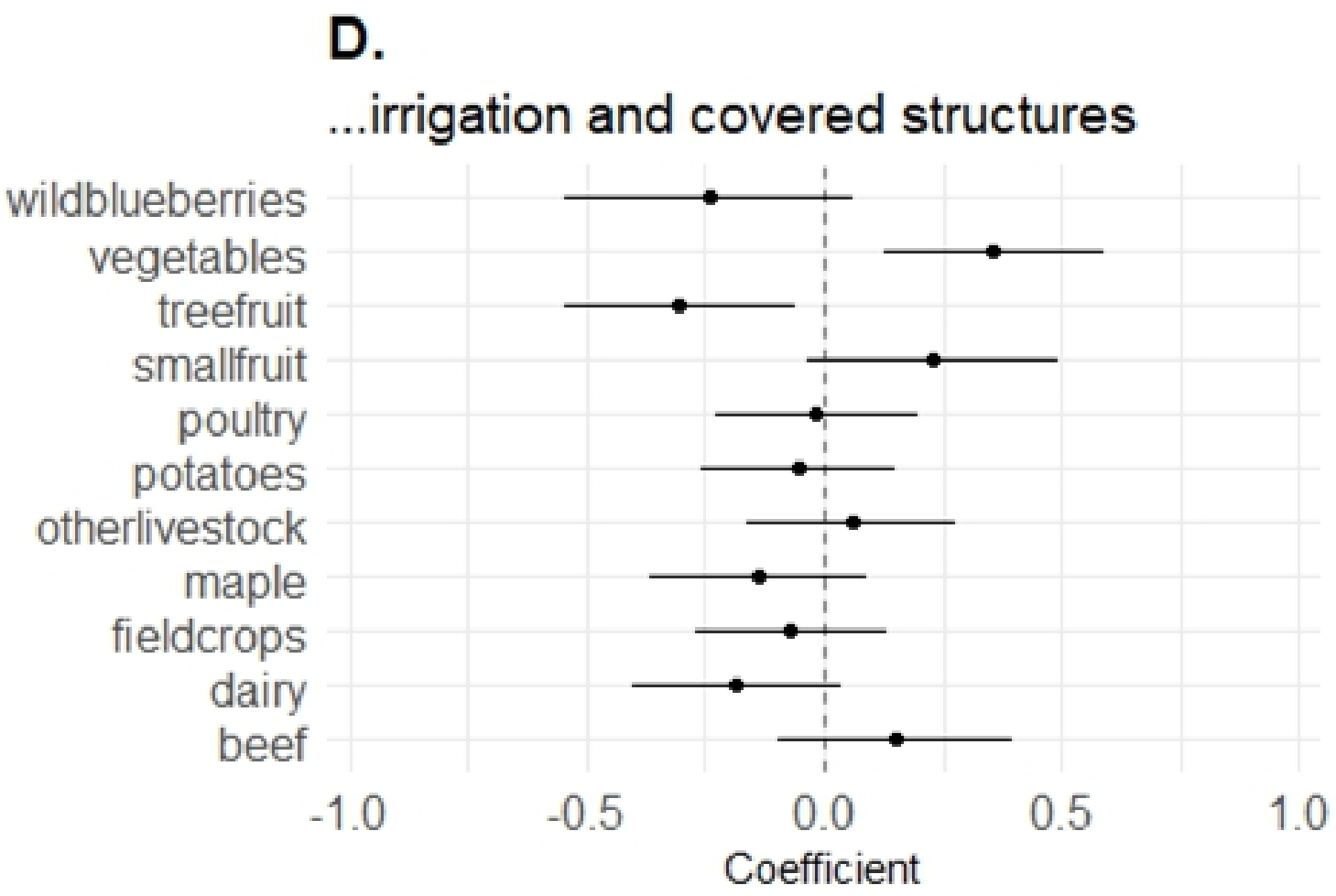

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Key takeaways

- ★ Agricultural advisors perceive a high degree of risk associated with extreme precipitation, drought, and changing weather patterns.
- ★ **Self-reported expertise in most water-related skills is low.**
  - ○ Most (76%) of respondents indicate that they would like to better understand who to refer farmers to when it comes to getting technical advice or financial resources related to water management.

Key takeaways

- ★ According to agricultural advisors:
  - Field crop producers are more likely to be knowledgeable and skilled when it comes to soil management;
  - Vegetable producers know about water source development
  - Field crop and dairy producers know about excess water management

Key takeaways

- ★ Agricultural advisor confidence supporting farmers varies:
  - ○ Those who work with field crop producers are more confident than other advisors when it comes to advising on soil management;
  - ○ Those who work with field crops, dairy, and beef producers are confident advising on water source development;
  - ○ Those who work with vegetable producers are confident advising on irrigation and covered structures.

Research Question 3

Are farmer needs aligned with what agricultural advisors can currently provide?

Image credit: ngupakarti

	Survey statement	Mean (SD)
New strategies	Climate change will necessitate that Northeast farmers adopt new and different water management practices	4.18 (0.80)
Investment	Greater investment is needed in water-related agricultural services to meet the needs of Northeast farmers	4.02 (0.82)
Knowledge	Within the community of agricultural advisors in the Northeast, there are individuals and organizations with the knowledge to support farmers to address water-related challenges	3.89 (0.80)
Capacity	Within the community of agricultural advisors in the Northeast, there are individuals and organizations with the capacity (e.g., adequate time and resources) to support farmers to address water -related challenges	3.51 (0.94)
Drought support	Farmers currently have access to the support they need to effectively manage drought and dry periods	3.08 (0.94)
Excess water support	Farmers currently have access to the support they need to effectively manage wet periods or heavy rains	2.96 (0.92)
Current strategies	Current farm management practices are sufficient for effectively managing water on Northeast farms	2.58 (0.87)

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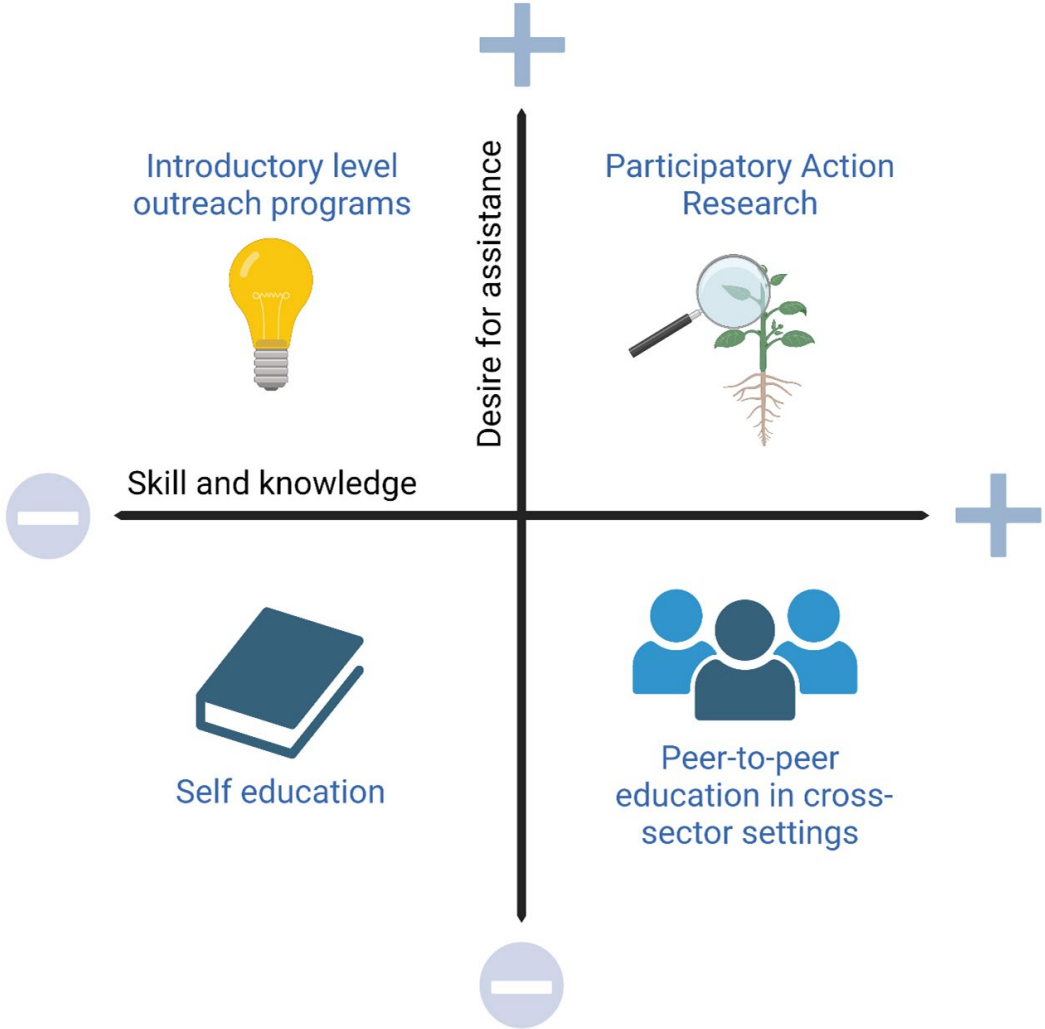


Figure created with BioRender

Opportunities for targeted outreach and technical assistance

Advisors perceive skills and knowledge to be high among Maine potato growers.

Maine potato growers desire more assistance in both soil/crop and water management, compared to farmers in other sectors.

This points to opportunities for…..

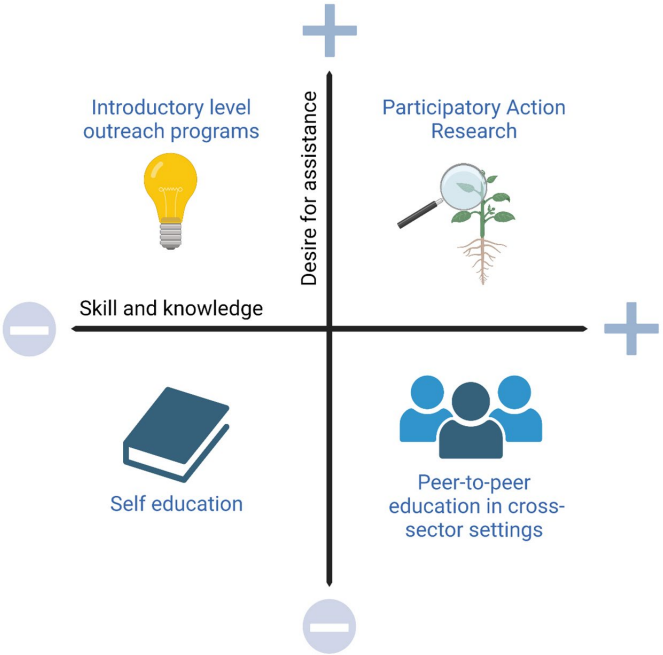
Participatory Action Research

Farmers desire financial assistance for

- ★ Water source development (installing wells and/or ponds)
- ★ Designing and installing irrigation systems
- ★ Tile drainage
- ★ Ditch work and water redirection
- ★ Soil health

In Conclusion

- ★ Farmers and agricultural advisors desire, and need, targeted professional opportunities;
- ★ There is knowledge in different sectors and areas of expertise, but we can learn from each other;
- ★ More financial resources are needed for water source development and drainage/water diversion.



Thank you!

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The Agroecology Lab

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